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Food Processing Industry in the Middle East
Beirut, 3-8 March 1975

THE SUGAR INDUSTRY
IN LEBANON^{1/}

by
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American University of Beirut

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Regional Meeting on the Development of
Selected Branches of the Food Industry
in Selected Countries of the Middle East

Beirut, Lebanon, 2 - 8 March 1975

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I. Introduction

The sugar industry in Lebanon started in 1937 as an industry of processing and refining of imported raw sugar. Again much of the demand was satisfied by the importation of refined sugar.

Today, there are three such factories that convert imported raw sugar into refined sugar. Also in 1957 the first and only factory that processes sugar from sugar beets started operation. All four plants are in operation now and they satisfy the major portion of the demand for sugar in Lebanon, thus constituting one of the major food industries in the country. An account of the four plants in Lebanon is shown in Table 1.

II. Raw Materials

1. Availability

Because of the good price offered for sugar beets, Lebanese farmers have found beet production very profitable compared to production of other crops. As a result they have been producing almost too many sugar beets. Thus the availability of beets for the sugar factory was more than adequate.

However, recently it has been observed that sugar beet planting is gradually decreasing due to the following reasons:

- a. Rotational planting cycle should be followed if good yields are to be followed if good yields are to be maintained.
- b. Manpower is becoming increasingly expensive.
- c. Chemical fertilizers have become very expensive.
- d. During the last three years, there was scarcity in water for irrigation.
- e. Unexpected decrease in sugar content of beets grown in Lebanon.

Thus it appears that at present the supply of beets is adequate.

2. Suitability

Generally the beets grown in Lebanon are suitable for the sugar industry. However, in recent years the sugar content of the beets have been decreasing, unexpectedly. The reasons for this problem are not very clear, but may be due to the increased use of fertilizers and irrigation water.

3. Prices

The price of sugar beet that the Government paid the farmers during the 1972-73 season was 60 L.L. per ton, delivered at the factory.

The price set for the 1974-75 season is 75 L.L. per ton of beets containing 16% sugar. Should the beets contain more or less than 16% sugar, the price paid will be respectively increased or decreased.

The sugar factory is expected to produce 1 kg of sugar out of every 8.7 kg of beets (or 115 kg from every ton). And for this operation the sugar factory is paid 270 L.L. per ton of sugar it produces.

Again the sugar factory sells the seeds to the farmers at the price of 4.50 L.L. per kg.; and every 1 kg of seeds is sufficient for planting 300 sq. m. of land.

4. Imports

There is no import of sugar beets into Lebanon. However, Lebanon imports large quantities of raw sugar for refining in Lebanon. This constitutes the operation of three of the existing factories.

The amounts of raw sugar imported into Lebanon are shown in Table 2. It can be observed that the imports of raw sugar into Lebanon has been increasing.

5. Exports

There are no exports of sugar beets or raw sugar from Lebanon as part of the industrial sector. Some quantities of raw sugar may pass through Lebanon in transit to other countries.

Summary

In summary it can be concluded that the raw material sugar beet is available in sufficient quantities at prices advantageous to both the farmers and the sugar factory, although the beet are not always of the required quality in terms of sugar content. Again, for the sugar refining factories, sufficient quantities of raw sugar are imported into Lebanon.

III. Production and Processing

A. Description of existing plants

1. History

The first factory in Lebanon for refining sugar from raw sugar started in 1937 and was located in Chekkah. Since then two other plants for refining sugar were constructed in 1950 and 1954 (Table 1).

The only factory in Lebanon that can process sugar from raw beets is located at Anjar and started operating in 1957. This factory also has the capacity to refined raw sugar. However, it should be mentioned that the Government showed intention to allow the building of another factory that can process sugar from raw beets. This new factory was to be completed in 1975, and be located in the Beqa'a with a capacity for 60,000 tons of beets and 24,000 tons of refined sugar.

2. Location

The location of the factory that can process raw beets is in the Beqa'a valley, since that is the area where beets are grown. Again, if another factory is to be built it should be located in the Beqa'a, since that is the suitable and logical location for it.

However, the refining factories are distributed among the Beqa'a valley, Beirut area, and Chekkah in the north, as shown in Table 1. This distribution of the refining factories is of an advantage to Lebanon in distributing the industrial sector to cover all parts of the country.

3. Capacity

The capacity and volume of production of the different sugar factories in Lebanon are shown in Table 1.

The capacity of the Anjar factory was about 1300 tons per 24 hours during the last processing season 1973-74. It is expected that with the installation of the new Diffuser the capacity will be about 2000 tons per 24 hours during the 1974-75 season. Thus the capacity of the Anjar plant for processing beets is over 150,000 tons per season. Considering the conversion ratio of 100 tons of beets to 13 tons of sugar, the capacity of the plant will be well over the 15,000 tons figure given in Table 1.

As for sugar refining, in Lebanon there is excess refining capacity, and the factories are presently utilizing only a small portion of their installed capacity. The reason behind this is that imported raw sugar is allocated among the factories in proportion to their installed capacity.

Thus all plants have plans to increase their capacity, while no justifiable reason exists for it. This means that either the Government or the consumer will eventually and unnecessarily pay for this, depending on the pricing policy at the time.

4. Volume of Production

The estimated production of refined sugar in Lebanon in 1971, was about 68,000 tons as shown in Table 1. It is also estimated that last year, the production was at least 75,000 tons.

5. Description of sugar processing from beets

The trucks carry the sugar beets to a horizontal silo, water carried to beets to the pump that pumps the beets to the top of the factory where they are washed thoroughly by water. Next the beets are transferred by a belt conveyor to the high-speed beet slicers where they are changed into corsettes, average dimensions 8 cm x 3 cm x 4 cm. These corsettes are then blanched by steam to inactivate the surface enzymes and to expand the beet cells for easy rupture and easy extraction of sugar. Next the blanched corsettes are vertically transferred from bottom to top of a vertical Extractor called diffuser in the sugar terminology where sugar dissolves in hot water whose temperature, pH, dispersed ions are electronically controlled, this water which has the sugar dissolved in it is now called SAN JUICE. Corsettes, which are now free of sugar except for traces which range between 0.1% and 0.7% and which depends on the efficiency and close control of the extractor, are now pressed and is called now pressed pulp. This pulp is now transferred to a Forced-draft oven and is dehydrated at a temperature which ranges between 75-95°C depending on the pressed pulp. Final moisture content of dry pulp ranges between 11-13%. It is important to maintain this moisture content since higher figures might cause the pulp to ferment and thus decreases its shelf-life, lower figures all might decrease the ignition temperature at which the pulp might easily catch fire. The dried pulp is sold to the farmers as a feed for the dairy animals, factory is entitled to sell the dried pulp to the farmers at 30 L.L. per ton delivery at factory.

6. Level of technology

The processing equipment in the sugar factories is good equipment, but has become old. Periodically more equipment has been installed, but only to increase the capacity. However, automation and computerizing the processing equipment may be introduced. There is room for improvement. Thus the level of technology is less mostly unchanged, compared to new improvements in more advanced countries.

7. Manpower and labor

Labor and manpower are available in abundance. Labor is seasonal and trained mechanics are well experienced.

8. Organization and management

It appears that there is room for better organization and management in the sugar factories in general.

9. Technical consultants

Consultants to the factories are available throughout the operating season. Some of these consultants are foreign working with the factories on contracts.

10. Quality control facilities

Quality control laboratories are available at the sugar factories. However, some of the equipment used has become old and outdated. Thus there is room for improvement in the Quality Control facilities. New and efficient equipment is available now on the market.

Quality control tests run in these laboratories included the following tests:

1. Sugar content (by polarimetry)
2. Total soluble solids (by refractometers)
3. Purity
4. CO_2 content
5. pH
6. Moisture content (by infra red)
7. Invert sugar
8. Ash content

11. Suitability for expansion

It appears that the Sugar plant is suitable for expansion as far as the processing aspect is concerned. The availability of raw materials should be taken into consideration.

12. Problems facing the existing plants

1. Processing problems

There appears to be no major processing problems facing the sugar factories. However, as for the Sugar plant, one such problem may arise from the unsuitable quality of the raw materials (sugar beets) at certain times. This is in reference to the low sugar content or high mineral content beets that are received at the plant. With such raw materials it becomes increasingly difficult to produce the high quality product desired.

2. Quality control

Because of the lack of an efficient and guide system of quality control during the processing procedure, the control of the quality of the final product or refined sugar becomes difficult. Thus, again the quality of the product may not always be as desired.

3. Manpower

There appears to be no major problem with available manpower.

4. Professional and technical personnel

The sugar factories, similar to other food plants in Lebanon, have the problem of lack of local professional personnel. Trained local food technologists trained in the sugar industry are unavailable. Thus these factories depend on foreign personnel for the highly technical matters.

5. Water

There is no water problem for these factories. There is sufficient water which goes through water treatment at the factories before use.

6. Electricity

There is no electricity problem. All the factories have their own stand-by generators.

7. Transportation

The only transportation problems are due to bad weather conditions. There are mainly two obstacles: (a) when there is snow and this hinders transportation; (b) when it rains heavily, there are difficulties for trucks going into the fields. However, these conditions are not very frequent and should not be considered as a major problem.

8. Financial

It does not appear that there are any financial problems that are a hindrance to the sugar factories in Lebanon.

III. Final Products

A. Brief description of products

1. Quantity produced

As mentioned before, it is estimated that a quantity of 75,000 tons of refined sugar was produced last year in Lebanon.

2. Packaging

The Anjar plant packages its refined sugar in 100 kg jute bags. Other refining factories package their products in 50 kg, 70 kg, and 100 kg jute bags.

Also two factories manufacture sugar cubes which are packed in kilogram carton packages.

3. Quality

The Lebanese Standard for sugar is shown elsewhere in this report. The standard is compulsory. However, it may be mentioned that refined sugar manufactured in Lebanon does not necessarily adhere to the Lebanese Standard set in 1964. The product may adhere to the Standard, but not necessarily intentionally produced to adhere to the Standard.

In general the quality is adequate, by many batches put on the market are of poor quality due to reasons mentioned before.

4. Marketing

All the marketing of sugar produced by the sugar factories in Lebanon are marketed under the supervision of the Government. Specifically, the Office for Cereals and Sugar in the Ministry of National Economy is the responsible office for the sugar industry.

5. Marketing Prices

The retail price for sugar at present is about 75-80 P.L. for refined sugar, and about 100 P.L. for sugar cubes. Again the imported similar products are more expensive.

It should be mentioned here that although retail price for sugar is about 75-80 P.L. per kilogram, the actual cost of raw sugar is much more than that; however, the Government is subsidizing this and is paying for the difference.

Recent official bulletins give the wholesale price for refined sugar as 73 P.L. per kg while the retail price is 80 P.L.

6. Trends during the last few years

1. Imports

The trends in imports of raw and refined sugar into Lebanon are shown in Table 2. It can be observed that the import of raw sugar has been increasing generally during the last few years; while no trends are apparent for the imports of refined sugar.

2. Exports

Sugar is not exported as such from Lebanon. However, large quantities are exported as part of processed foods such as confectionary and jam.

It is estimated in Lebanon that 65% of all sugar produced locally is consumed by the food industry. One factor that encourages this pattern is that sugar, because of the Government subsidy, is cheaper in Lebanon for the food industry than in the other neighboring countries.

3. Production

The trends in the production of beets and refined sugar in Lebanon over a ten-year period are shown in Table 3. It can be observed that beet and sugar production increased until the year 1966, and then from 1966 to 1970 no noticeable change occurred. However, although

not shown in Table 3, it is estimated that since 1970 beet and refined sugar production have increased as shown by the 1974 values. The reason for this is the increased demand for sugar by the food industry.

4. Consumption

It is estimated that consumption of sugar in Lebanon is about 75,000 tons per year. This means that the average consumption per capita is about or over 25 kg per caput per year. However, it is difficult to make any definite conclusions on trends since part of this consumption goes into processed foods that are exported from Lebanon.

5. Prices

Trends in the wholesale and retail prices of refined sugar in Beirut are shown in Table 4. It can be observed that the trend is towards a slow increase in both prices. Actually, the increase per year can be considered as very small.

6. Projected trends

Projected trends in the production and consumption of refined sugar in Lebanon are presented in Table 5. However, the values given in the table which was published in 1971 do not show the true picture any more. It is estimated now that the present consumption of sugar is in the order of 75,000 tons, and therefore the consumption in 1977 will be considerably more than the given 65,000 tons.

Again concerning the projected production of 62,000 tons in 1977, there is no strong reason to believe that production will not be much more than 62,000 tons, since the capacity of the already existing plants can reach 130,000 tons as shown in Table 1. It appears that the refining factories are ready to process sufficient quantities of imported raw sugar to satisfy the demand, since they are paid according to the amount they process. However, this will depend on the Government policy concerning the imports of raw sugar and whether it intends to limit imports to any degree, since the Government is subsidizing imported raw sugar.

Government Policy

Recently the government office concerned with the sugar industry which is the "Wheat and Sugar Beet Office" in the Ministry of National Economy is completing studies in which they are evaluating the whole industry ranging from beet production to refining and distribution. According to the Office, the studies should lead to a new sugar policy in Lebanon the intention of which would be to achieve the following:

- a) higher prices paid to beet growers to encourage increased beet production.
- b) setting strict quality standards so that a standard product will be marketed.
- c) to restrict distribution of sugar to wholesalers and not to food factories.

The food factories are left then with two alternatives:

- (1) either buy their needs for sugar from the free market, or
- (2) reduce the price of their commodities that utilize sugar commensurate to the reduced price of sugar that they purchase from the Government.

V. General Conclusions and Recommendations

The sugar industry is one of the major food industries in Lebanon, although the processing of sugar from beets is still limited to one plant in the Beqaa, while three other plants satisfy the demand by converting imported raw sugar into refined sugar.

Up to the present, the production of beets has been sufficient for the production volume of the existing factory, generally, the quality of the beets grown has been adequate, although in recent years the sugar content of the beets have been decreasing. Should the volume of production of sugar from beets increase in the future, consideration should be given to increasing beet production in Lebanon.

From the technical point of view it appears that there is room for improvement and in upgrading the existing level of technology. Processing techniques could be improved as well as quality control procedures and instrumentations used. Also there is a lack of trained local experts for this industry.

The volume of production should be sufficient for the demand, although at times sugar seems to be missing from the market. However, should the demand increase, the existing plants can increase their production to satisfy the consumption values.

The quality of the final refined sugar product is not always of the degree desired. Often, catches of poor quality sugar are marketed and an improvement in that area is needed.

Economically, the industry must be profitable to the existing plants, since they are paid per ton of sugar they process. However, the Government burdens heavy losses from this industry since it purchases the raw sugar at a much higher price than the market price. Thus any increase in the price of sugar, the Government and the consumer pay for that, while the industry remains unaffected. Again, since the food industry purchases sugar at a lower price than that existing in neighbouring countries, large portion of the sugar consumption go into the confectionary and other related industries, again putting a burden on the Government. Thus a real assessment of the sugar situation in Lebanon should be carefully carried out in preparation for a better sugar policy in Lebanon.

The recommendations that can be offered at the present can be summarized into the following:

1. Should the production of sugar from beets be increased, encouragement in beet production should be considered. Sugar production from beets should be encouraged to make Lebanon more self-sufficient in Sugar.
2. Consideration should be given to improving the quality of beets produced, in particular to sugar content.
3. There should be an improvement in the level of technology with respect to processing and quality control techniques and instrumentation. Training of local experts is needed.
4. There should be an improvement in the quality of the refined sugar produced, and there should be strict adherence to official food standards.
5. The policy governing the sugar industry should be reconsidered to review the interrelationship of the Industry, Government and Consumer to sugar availability and costing for the interest of the three parties concerned.

Table 1.

Sugar Factories in Jordan (1971)

<u>Plant</u>	<u>Year Started</u>	<u>Capacity of Refined Sugar (Tons)</u>	<u>Production of Refined Sugar (Tons)</u>
Beirut	1950	From raw 30,000	30,000
Chickah	1957	From raw 30,000	11,000
Amjar	1957	From raw 50,000 & beet From beet 15,000	12,047
Tripoli	1964	From raw 20,000	15,000
	Total	130,000	68,047

Table 2.

Imports of Sugar into Lebanon
(1000 Tons)

<u>Year</u>	<u>Raw</u>	<u>Refined</u>	<u>Year</u>	<u>Raw</u>	<u>Refined</u>
1959	5.9	5	1965	60	21
1960	32.5	3	1966	39.6	5
1961	30.7	5	1967	30.9	4
1962	49.3	3	1968	15	8
1963	24.6	8	1969	31.3	12
1964	7.6	34	1970	14.8	6

Table 3.

Trends in Beet and Sugar Production

<u>Year</u>	<u>Area (hectares)</u>	<u>Beet Production (Tons)</u>	<u>Beet Yield (Tons/hectare)</u>	<u>Refined sugar From Beet (Tons)</u>	<u>Refined sugar from imported raw sugar (tons)</u>
1960	850	18,000	21.2	2,486	
1961	800	21,900	27.4	3,238	
1962	1,000	30,000	30.0	3,721	
1963	870	31,000	35.6	3,947	
1964	1,800	77,000	42.8	8,685	
1965	1,500	73,770	49.2	7,895	
1966	2,000	100,000	50.0	12,503	
1967	2,100	110,000	52.3	10,826	27,174
1968	2,500	118,952	47.6	9,806	18,194
1969	2,200	94,000	42.7	9,608	22,392
1970				12,047	
1974	3,000	180,000	60.0	app. 20,000	

Table 4.

Prices of Refined Sugar

<u>Year</u>	Whole sale price in	Retail price in
	Beirut of Refined Sugar <u>P.L./Kg</u>	Beirut of Refined sugar <u>L.L./Kg</u>
1960	62	65
1961	60	65
1962	51	55
1963	61	66
1964	82	85
1965	62	65
1966	63	65
1967	63	67
1968	62	68
1969	67	72
1970	71	75
1971	75	79
1972	72	76
1974	74	80

	<u>Raw</u>	<u>Refined</u>
Tariff rates on	61.62%	125%

Table 5.

Projections of Refined Sugar Consumption
and Production in Lebanon

Apparent Consumption in 1970:	50,000 Tons
Growth Rate:	1%
Projected Consumption in 1977:	65,000 Tons
Projected Production in 1977:	62,000 Tons
Projected shortage in 1977:	-3,000 Tons

Planned New Sugar Factory in Lebanon

Location : Beqaa
Capacity : 60,000 Tons
Refined 25,000 Tons
Completion: 1975